

ANNUAL REPORT 2019

PTAC **PETROLEUM
TECHNOLOGY
ALLIANCE
CANADA**



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ABOUT US

Petroleum Technology Alliance Canada (PTAC) is a neutral, not-for-profit association that promotes innovative, collaborative research and technology development within the Canadian oil and gas industry.

MISSION

With over 20 years of proven experience, PTAC is on a mission to significantly improve the environmental, safety, and financial performance of member companies. Working directly with producers, federal and provincial governments, regulatory bodies, technology providers, academic institutions, service and supply companies, entrepreneurs, and transporters, PTAC has completed nearly 500 R&D projects.





MESSAGE FROM THE BOARD

Soheil Asgarpour, President
Kevin Stashin, Chairperson

The Canadian oil and gas industry is facing an extraordinary confluence of challenges: a COVID-19 pandemic that has drastically altered working conditions and decimated demand, a price-war that has perpetuated a significant drop in oil price, the persistent quandary of resource transportation, and unrelenting pressure to meet or exceed environmental targets. To secure the future prosperity of our industry in these unprecedented times we must pursue innovation and technology development to reduce costs and improve the bottom line. Collaboration has never been more crucial.

When we look at the achievements of 2019 through the lens of our current situation, it's easy to lose sight of the many goals we accomplished. It was a good year. Not only did PTAC direct the most projects in the history of the association, we bolstered our financial position with the second-highest project revenue ever, and grew our membership numbers to the highest in a decade. This strong performance has positioned PTAC to effectively support our industry through the current challenges.

Last year PTAC facilitated, coordinated, and managed 116 collaborative innovation and technology development projects to help the oil and gas industry reduce costs and mitigate environmental impacts. These projects were guided and supported by more than 220 industry experts representing a broad spectrum of stakeholders from large producers to small service and supply companies.

PTAC projects have always aimed to both address current needs and realize a more competitive and sustainable future. However, in 2019 we introduced a new initiative to ensure that they continue to create tangible value for industry. The performance and impact of every PTAC project is now measured and the cost savings/value-creation confirmed by producers. This strengthened alignment with industry adds an extra degree of transparency and will accelerate commercialization of the most pertinent new technologies.

Taking the time to look back with a critical eye, we also completed two studies that assessed and quantified the value of past PTAC applied research projects. The first, which focused on technology development projects completed through PTAC consortia, will be published later in 2020. The second, focused on the value created by AUPRF projects. Since the program began, producers have invested \$26

million in 461 projects. The study's investigation of the nine highest-value projects from each of the five technical areas estimates that these 45 projects are currently saving producers \$78.4 million per year with a projected future value of \$203.6 million per year. That is a substantial return on investment. These studies paved the way for future expansion of the collaborative research program.

PTAC also continued to drive the development of new technology through its affiliation with the Clean Resource Innovation Network (CRIN). The network-of-networks, CRIN is a legal subsidiary of PTAC with the members of the association's Executive Committee playing a leading role in establishing the Corporate Governance framework of CRIN. In addition to the network's exponential growth to over 1,200

“This strong performance has positioned PTAC to effectively support our industry through the current challenges.”

members in two short years, CRIN has aided in substantial advancements throughout 2019. This includes the work of its sub-network, the Methane Emissions Reduction Network (MERN) innovation ecosystem.

While Canada has pledged to reduce methane emissions by 45 percent by 2025, PTAC's goal is to increase industry technology capacity by 45 percent by 2021 at a cost of less than \$5/tCO_{2e}. This increased capacity will equip producers to meet the 2025 target. We anticipate that accomplishing this goal will create 2,300 industry jobs and help SMEs and

technology providers grow their businesses, all while saving the Canadian oil and gas sector \$550 million per year. PTAC's long-term vision is to increase technology capacity by 90 percent by 2030.

To this end, PTAC launched several exciting research and technology initiatives for the detection, quantification, and mitigation of methane emissions in 2019. Highlights include an affordable and fail-safe electric dump valve actuator (EDVA) that replaces pneumatic valves and eliminates methane emissions; a large-scale deployment of the Intelligent Methane Monitoring Mitigation System (IM3S), an analytics platform that will maximize methane emissions reductions, minimize costs, and optimize regulatory instruments; the Systematic Third-party Validation of Environmental and Economic Performance of Methane Reduction Technologies (STV) that will inform the purchase of equipment and increase market uptake of proven technologies. and the Alberta Methane Field Challenge (AMFC), a pilot aimed at advancing reliable, accurate, and cost-effective methane detection technologies.

PTAC also continued its efforts in 2019 to expand the Canada Emissions Reduction Initiatives Consortium (CanERIC). The CanERIC consortium identifies and closes the gaps in testing capability and ensures Canadian researchers and innovators have access to high-quality lab- and field-testing facilities. To date, 15 producers have agreed to provide CanERIC with dedicated field facilities worth over one billion dollars, while ten universities and four R&D organizations are providing dedicated lab facilities. This new initiative will help innovators overcome the development hurdles colloquially termed "the valley of death" and bring more technology to market.

The results of PTAC's 2019 collaborative innovation and technology development projects were disseminated through a variety of events including forums, workshops, and Technology Information Sessions (TIS) as well as a growing series of improved communications outlets. More people heard about PTAC and engaged with us through our expanded social media and public events.

Responding to the events of early 2020, PTAC has retooled our plans to focus on helping industry weather this very difficult storm. We will continue to facilitate the MERN Innovation Ecosystem, as the potential benefits will help buoy up a hurting industry. The Alberta Methane Field Challenge will expand to several more regions, giving more Canadian innovators the opportunity to move their technology forward. The AUPRF program will pivot towards research focused on cost-effective solutions for remediation, reclamations, and methane detection. Meanwhile, CanERIC will field-test several new methane detection and mitigation technologies, investing more than three million dollars to help close the equipment gaps at universities and labs across Canada.

Digital technologies can help industry reduce its costs in this

or any environment. PTAC will launch several novel digital technologies to help industry realize crucial reductions in capital, operating, and G&A costs. We understand that while collaborative innovation and technology projects proceed, field demonstrations may be delayed as we flex to stay in step with industry capabilities.

We know that our industry is strongest and most resilient when we work together. In 2020, PTAC will expand our collaborative R&D program to incorporate more global partners. Building upon the success of several international projects completed over the past four years, PTAC will seek out partnerships with like-minded countries and international organizations who share our commitment to methane emissions reduction and innovation technology development. We look forward to leveraging our collective expertise and funding to allow us all to dream bigger and do more.

Past, present and future, one thing is abundantly clear. PTAC's successes belong to the members who make up our organization: Stakeholders who believe in the PTAC collaborative model. Organizations willing to take risks together in support of innovation. Individuals who serve on the PTAC Board of Directors, Board Committees, Technical Committees, and Steering Committees. Thank you for your continued support.

As we stare down what is sure to be a challenging year, PTAC remains committed to helping Canada become a global leader in the Canadian hydrocarbon energy industry, and we will continue to find creative and innovative methods of collaboration to achieve that goal together.

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PROJECTS

In 2019 PTAC facilitated, coordinated, and managed 118 active projects, the highest number of ongoing projects since the association's inception in 1996. These projects were guided and supported by over 250 industry experts from our diverse stakeholders. Many of the technologies developed through PTAC consortia have immensely helped industry reduce its environmental footprint while improving financial performance.

Advanced Methane Detection, Analytics and Mitigation Project

Supporting the overall Canadian government's methane emission reductions goals, this project was launched in 2017 and completed in 2019. It demonstrated the scalability and ability of several novel technologies to detect, analyze, and reduce methane emissions. It was composed of seven subprojects, including novel remote sensing sensors, analytics software, solar electric system solutions, and related technologies for methane emissions reduction.

Agronomic Receptor Evaluation for Direct Soil Contact

The ecological direct contact pathway for soil salinity is currently ubiquitously applied to all land use scenarios at all depths. However, the Ecological Criteria Advisory Subgroup agreed that at some depth, ecological exposure will no longer occur. That depth has not yet been determined.

The completed project will provide a robust understanding of the effect of salinity on eco-direct contact receptors and ultimately provide recommendation for an exclusion depth, resulting in less unnecessary remediation, industry and provincial cost savings, and reduce land disturbance through remediation. Results will also further provide a significant increase to the current body of knowledge specific to the agronomic and eco-contact receptors of Alberta.

Alberta Methane Field Challenge (AMFC)

The Alberta Methane Field Challenge will identify and evaluate LDAQ methods that inform viable alternative LDAR program development suitable to meet Alberta and British Columbia emissions reduction requirements while significantly reducing LDAR program costs.

The Alberta Methane Field Challenge is a unique collaborative field trial for assessing real-world performance of new methane sensing technologies in comparison with conventional optical gas imaging-based leak detection surveys.

The following groups organizations were instrumental in both trials: Cap-Op Energy, DXD Consulting, Harrisburg University, and Davis Safety.

The following organizations took part in Fall 2019:

- Aerometrix
- Altus Group, Geomatics
- Bridger Photonics
- Heath Consultants Inc.
- SeekOps
- University of Calgary

The following organizations took part in Winter 2019:

- Altus Group, Geomatics
- Cap-Op Energy
- FLIR Systems
- Sander Geophysics Ltd.
- Tecvalco
- University of Calgary

Alberta Water Tool

Launched in 2019, the Alberta Water Tool provides streamlined access to water supply, demand, and environmental flow needs across more than 200,000km² of Alberta. The tool provides scientifically defensible, high quality reports at a user's location of interest that can be used at the planning stage for water supply assessment and is regularly provided as supporting material for water use applications from industry or consultants working on their behalf.

The tool was later updated to include Water Use Reporting, providing transparent access to reported water usage in Alberta. This feature is added transparency around water sourcing, as this information has not been publicly accessible before.

Algar Caribou Habitat Restoration Project

The Algar Caribou Habitat Restoration Program was initiated in 2011 by six oil sands companies to improve undisturbed caribou habitat by restoring historic linear footprint off lease and within the East Side Athabasca River caribou range in northeast Alberta. With consistent understanding of growing seasons and other ecological factors, the scope of work for 2019 helped lay the groundwork for additional data capture and further validate the use of UAS to conduct post-treatment monitoring. Work will continue in 2020.

Alternative Water Source Life-Cycle Management Framework

The key output of the project is the Screening-Level Risk Matrix (SLRM), a functioning spreadsheet tool which provides users with a high-level assessment of the risks associated with the use of alternative water sources for MSHF projects. At this time, the SLRM is designed for projects involving treated municipal effluent and produced and flow-back water, although it can be expanded to include additional alternative water sources in the future.

Area Methane Detection Using Work Trucks

Launched in 2017, the final report for this project was completed in 2019. A work truck-mounted sensor technology was demonstrated in controlled testing and real-world field testing at an operating oil and gas facility in Western Canada. The project demonstrated that this technology could provide reliable scalable and effective methane emissions detection and quantification.

Canadian Emissions Reduction Innovation Consortium

The Canadian Emissions Reduction Innovation Consortium (CanERIC) is a network of emissions reduction test facilities with a vision to encourage national integration and collaboration. Encompassing field assets and testing facilities worth over \$1 billion, this project champions for large-scale field deployment of technologies through trialing new technologies at a complete range of upstream oil and gas assets.

CanERIC covers the full spectrum of methane emissions sources and solutions, from detection, quantification and mitigation to combustion and conservation from oil and gas facilities. The project was launched in 2019 with 14 production and midstream companies and 14 institutions with methane emission testing equipment from across Canada. The consortium will test technologies to reduce methane emissions over the next two years.

Canada Warbler Response to Vegetation on Recovering Energy Sector Disturbances

This project is looking at the total impacts energy development has on the Canada Warbler. Project shows that habitat loss is occurring due to energy development with weak evidence of habitat fragmentation effects (sometimes positive, sometimes negative). This work also demonstrates that the cumulative effects of development and other activities are altering the size of Canada Warbler populations in the region based on changes in habitat availability but that these effects are mitigated over time as vegetation recovers.

Data Compilation and Analysis of Phase II ESAs Associated with Drilling Waste Disposal Locations

Experience suggests that current compliance options may be overly conservative. Reducing the conservatism in the compliance options has multiple benefits with the same environmental protection:

- More accurate and reproducible compound calculations and DST assumptions
- Reduced number of unnecessary Phase II ESA conducted on well sites
- Accelerated progression of sites to reclamation certification

The intended outcome of this work program is to determine if the compliance options are appropriate as currently written; require adjustment to reduce false positive or negative triggers for Phase II ESAs; or are in need of other changes.

Digital Innovation Network

Digital innovation is a key enabler in oil and gas to reduce costs, make efficient and more relevant decisions, and increase productivity. The Digital Innovation Network (DIN) leverages the innovative spirit of Alberta producers, researchers, academia, government organizations, regulatory bodies, and entrepreneurs and contributes to the direct creation of thousands of jobs in Alberta thanks to an increase in operator demand for installations of digital technologies. DIN provides a plethora of capabilities at a level and pace not previously available and will deliver outcomes that are currently out of reach for the existing digital innovation ecosystem with a focus on helping facilitate the export of innovative technologies to other national and global jurisdictions and industries.

Efficient Monitoring of Wildlife Responses to Seismic Line Restoration in the Algar Habitat Restoration Program

The Algar Wildlife Monitoring Project will provide significant benefits to Alberta and its petroleum industry. Demonstrating an ability to cost-effectively restore widespread energy footprints like seismic lines is a key part of improving environmental performance, meeting regulatory requirements, and facilitating social license to operate.

Electric Dump Valve Actuator

Launched in 2019, this three-year project will see the creation of an electric dump valve actuator (EDVA). The first task, initiated in 2019, was to obtain customer technical requirements in collaboration with end-users in the PTAC network. Three increasingly complex prototypes will be developed and tested. The first prototype has been completed and provided learnings for the next iteration, which will be produced and lab-tested in 2020.

Evaluation of New Grizzly Bear Genetic Scat Results with DNA Results from Hair Collection - A Test and Comparison of Population Monitoring for the Future of Provincial Grizzly Bear Monitoring

Results from this project will benefit the energy sector with continued and ongoing access to provincial lands identified as grizzly bear range while showing that these activities and grizzly bear recovery can co-occur. At a broader level this research will benefit Albertans who are concerned about the long term survival and conservation of grizzly bears in the province.

Evaluation of Reclamation Practices on Forested Upland and Peatland Well Sites

The goal of this project is to provide recommendations for an acceptable policy framework/decision support tool(s) to assist industry and regulators in making decisions around appropriate management and certification of these sites that ensures that functioning ecosystems are developed and that there is a process that outlines eligibility for reclamation certification.

Field Study of Pipeline Segments Abandoned on Farmland

In 2017, PARSC commissioned a study titled “Review of Previous Pipeline Abandonment Programs, Phase 3 – Abandonment on Farmland” to conduct an initial surficial observation of a previous pipeline abandonment program abandoned between 1978 and 1980. This 2019 project commissioned an additional study that built on the 2017 work. Results are being analyzed and will be available in 2020.

Fugitive Emissions Monitoring Program (FEMP) Feasibility Study

The FEMP Feasibility Study is designed to compile and assess comprehensive data on leak detection technology performance, costing, and scaling from all market-ready and prospective technology and service providers.

Finalization of Research and Preliminary Selenium Soil Quality Guideline Derivation

An in-depth literature assessment indicated that no regulatory agency has developed defensible soil quality guidelines for selenium that incorporate the influence of sulphate, a common salinity ion encountered naturally in the Western Sedimentary Basin. The development of such a guideline will demonstrate a clear technological advancement in environmental regulatory guidelines using a sound science-based approach.

The scientific community will benefit from this advancement of research as well as other industries in Canada including mining and the agricultural sector, as selenium is a trace nutrient for plants. Focusing remediation efforts away from guideline exceedances that are not associated with an unacceptable potential for adverse effect, results in a more expedited and efficient process when evaluating selenium impacts at hydrocarbon energy industry sites.

Hydropti: A Decision Support Tool for Water Management in Oil and Gas Unconventional Plays

A web-based decision support tool for identifying the minimum cost water management strategies for hydraulic fracturing applications, this project extended the capabilities of Hydropti to facilitate a more detailed environmental net effects evaluation of all identified water management plans and their corresponding infrastructure.

The objective of this work was to perform an evaluation of five alternative water management strategies in the unconventional developments planned in Central Alberta (MD of Greenview). The Hydropti software was configured to ensure that all possible water sources can be identified as well as to evaluate the costs associated with water transport, disposal, and storage. Documentation and tutorials also become available within the tool and provide the modeling basis as well as workflow for creating and solving cases.

Intelligent Methane Monitoring and Mitigation System (IM3S)

Starting in 2019, IM3S supported real-world field testing of advanced methane emissions detection and quantification technologies that are more effective than the existing methods and are closely aligned with the PTAC Alberta Methane Field Challenge project. IM3S is also supporting the development of an advanced computer model to determine the equivalency of different methods to detect and quantify methane emissions. The project will continue in 2020 with additional control release testing and computer model development.

Low Probability Receptor Assessment

Assessment, remediation, and reclamation of contaminated sites in Alberta are driven by regulatory requirements. In most cases, these sites must meet guidelines that are protective of all receptors and exposure pathways which are linked, by definition, to a given land use.

Goals of the Low Probability Receptor initiative are:

- Reduce upstream environmental liability by \$14B
- Reduce GHG emissions by 2.3M tonnes
- Reduce activities that cause human health impacts
- Increase environmental protection

This project brings direct and high value to industry as it's a risk-based approach to remediation of almost 45 percent of the total liability in Alberta. The proposed outcome is a document providing scientific rationale supporting a framework for evaluating receptors on a site-specific basis.

Methane Consortia Program

In our constant endeavor to lower methane emissions through innovation, PTAC – along with Energy Efficiency Alberta – formed the Methane Consortia Program. In 2019, we issued an RFP inviting project proposals from facility owners in Alberta, encouraging them to work with innovative service providers to help reach proposed emission targets. These proposals will be reviewed for support in 2020.

Methane Emissions Risk Tool: Site Prioritization and Emission Closure Guidelines

This AUPRF project provides knowledge and information on key variables associated with leaking wells, a means to capture various regulatory policy components and emerging issues, and a method for assessing relative risk between wells and prioritizing sites for mitigation in a sensible risk-driven manner. For example, resources can be focused on wells that may represent a potential risk to receptors, whereas mitigation of well emissions in areas where receptor exposure potential is low could be deferred until there is an economy of scale, such as the wells being incorporated into an area wide closure.

Monitoring Linear Feature Reclamation Trajectories and Potential Impacts to Peatlands using Remote Sensing Methods

This project will develop remote sensing techniques for monitoring linear feature reclamation trajectories and potential impacts to peatlands using remote sensing methods. Additionally, we'll be looking at fine tuning remote sensing data analysis used to determine the reclamation status of linear disturbances.

Multi-year Compositional, Isotopic and Microbial Investigation of Gas Migration Issues to Develop “Best-Practices” for Industry (Year 3 of 3)

Phase 3 of our research program will integrate microbial (genomic and transcriptomic) and isotopic indicators (carbon and hydrogen) into the multiple indicator matrix (MIM) to resolve the dynamic changes that occur to targeted gases in the soil compartment.

NRC-IRAP Client SME Innovation

In 2019, PTAC concluded this 2018-19 SME project and renewed it under a new methodology. 10 Project Consortium Development engagements and 22 product-market fit engagements are underway.

NSERC FlareNet Strategic Network (Year 3 of 5)

The overarching objective of FlareNet is to provide a quantitative understanding of flare generated pollutant emissions critical to enabling science-based regulations, accurate pollutant inventories, understanding of climate forcing and health implications, and engineering design and assessment of mitigation strategies to minimize environmental impacts in the energy sector.

Peace River Abandoned Pipeline Segment Field Study Project

When pipelines are abandoned, the pipes degrade over time under natural conditions. The understanding of this process is mostly based on laboratory results and computer modeling. The purpose of the project is to conduct field observations and excavations of abandoned pipe segments to observe their actual condition so as to provide real-world information. The project focused on pipelines abandoned in northern boreal forest locations. Results are being analyzed and will become available in 2020.

Plant Uptake of Petroleum Hydrocarbons and Salt (NaCl) and Derivation of Soil-to-Plant Uptake Factors

Environmental Risk Assessment (ERA) is a specialized tool that can be used for management of contaminated sites, including oil and gas facilities and spill sites. The process involves identification of site-specific receptors (human and ecological), contaminants of concern, and exposure pathways through which receptors may come into contact with contaminants. This information is then used to qualitatively and/or quantitatively evaluate health risk. Ultimately, the goal for most sites where ERA is used is to obtain regulatory closure (and decrease environmental liability).

Plug and Abandon Strategies for Canada's Oil & Gas Wells (Year 3 of 4)

This four-year project has two key objectives:

- Assess the status of typical Canadian P&A operations, well architectures, and regulatory practices within a more global context through a detailed review of the scientific and engineering literature
- Target research in a series of complementary sub-projects that will provide physical and engineering rationale for regulatory and operational decisions that concern fluid mechanical issues, e.g. plug placement, cleaning of residual well fluids, mixing during placement, bonding/contact, squeeze cementing.

Phase 3 focuses on squeeze cementing, which is carried out either to seal the producing zone or to repair SCVF prior to abandonment. Sometimes the low pressure squeeze is carried out simultaneously with the plug placement. Here we focus on understanding the mechanics of penetration of the squeezed material into perforations, cracks, and pores. It's a difficult operation to detect leakage and then perforate and seal in a wide range of cracks, fissures, and pores. The aim is to bring a more mechanics-oriented approach to predicting the effectiveness of the operation.

Potential Impact of Abandoned Anode Beds Project

If left undisturbed, abandoned anode beds do not impact surrounding environments. However, the possibility exists that they could be accidentally disturbed after abandonment. This project's objective is to take the first step towards providing companies with a best practice procedure for anode grounded installations and abandonment.

The project performed a literature study of abandoned anode beds and the results are under review with hopes of providing a foundation for future best practices and a resource for companies to inform regulators and property owners.

PTAC's AUPRF Program: Value Added Through Studies Leading to Guidelines, Policy Changes and Technologies

This study investigated the value that AUPRF studies have brought to the Canadian Oil and Gas Industry. AUPRF is an industry sponsored research fund which conducts world class scientific studies that are used by regulators to create appropriate policies for the development and reclamation of oil and gas projects. The studies, ranging from the depth of roots to how grizzlies behave around seismic lines, have shown a positive value that the industry is benefiting by \$78 million/year through the policy and industry changes that have been made as a result of the studies. Once we include the expected benefit from studies underway and not yet completed, the value rises to over \$200 million/year.

PTAC Value Added Through Development of Technologies

The second study focused on assessing the benefits of the technologies developed through PTAC consortia since 2015 to the oil and gas producers. In addition to the AUPRF studies, PTAC has initiated over 300 projects since its inception in 1996 – 95 of which in the last five years. These studies have been conducted through collaboration with industry partners and have enabled industry to increase their bottom line by over \$50 million/year through adoption of technologies such as RemVIEW from Spartan Controls and solar powered pneumatic devices and chemical pumps. The projection is that these technologies once fully developed, will add over \$200 million/year to the industry.

Re-evaluation of F2 and F3 Petroleum Hydrocarbon Management Limits: Phase 2

The generic management limits for F2 and F3 can often become limiting and potential drivers for remediation when PHCs are present in subsoil below the depth that the eco-contact exposure pathway can be eliminated. The technical basis of the generic PHC management limits was constrained by time and budget during the development process in 2008. These management limits can drive significant remedial costs and, therefore, a re-evaluation is worthwhile at this time.

Regulatory Approval of Risk Assessment Tools

One of the key challenges in getting site-specific risk assessments approved by regulators is the lack of formally approved tools, resources and methods. This limits the review of risk assessments to a small number of technical experts with limited available time. However, there are a variety of tools already developed that are broadly applicable to large numbers of sites and have been shown to effectively reduce remediation requirements/costs at very low cost. If these tools were vetted and approved by regulators, the review and approval of risk assessments could be streamlined.

Remediation of Hydrocarbon Contaminated Soil and Groundwater using Heat-Activated Nano Stimulators

The proposed project will deliver cost-effective and environmentally friendly remediation systems utilizing the developed multi-functional stimulators for the PHC contaminated soil and groundwater. It is envisioned that the proposed technology will substantially reduce operating costs and the probability of secondary contamination during treatments, which are great benefits to oil companies. Moreover, the proposed technology will also considerably reduce the time required for PHC degradation through various mechanisms including, but not limited to, thermal decomposition, advanced oxidation, and hydrocracking, consequently expediting reclamation and vegetation of the contaminated sites.

Review of Previous Pipeline Abandonment Program: Phase 3 Abandonment on Farmland

The purpose of the project is to provide information about the condition of pipelines abandoned several decades ago in order to inform the current understanding of the degradation process. The project performed visual field observation of sites where pipe segments were abandoned on farmland and recommended the program for excavations and sampling, which is being implemented in 2020 as PARSC 17.

Review of Recent Pipeline Abandonment Research

The project provided a summary of six years of pipeline abandonment research by PARSC and concluded that the research contributed to solving critical gaps, such as corrosion modeling, conduit effect, and pipeline cleaning requirements gaps. However, more research could be done, and PTAC is continuing efforts to find budgets to do so.

Risk-Based Decision-Making Framework for Pipeline Abandonment

As pipelines near the end of their operational life cycle, decisions regarding how they will be abandoned are made. Operators make these decisions based on various considerations, of which include, but not limited to: contractual obligations, current and proposed land uses, cost, risks to human health and safety, ecology and environment, and valued/economic resources. Consultation with landowners and land managers must also play a central role in the decision-making process. This project updated the previous risk framework as recommended by a usability review commissioned by PARSC in a manner that would facilitate its use by all stakeholders.

Scientific Evaluation and Interpretation of Baseline Groundwater Well Testing Data Available for British Columbia

Expansion of oil and gas activities into unconventional resource plays has been tied to concerns about the current and future state of British Columbia's groundwater. A key step in addressing this concern is characterizing current baseline conditions in BC's aquifers in a scientifically sound manner. Following the highly successful project of similar scope in Alberta, this project compiled, evaluated, and interpreted all available baseline groundwater testing results on aqueous and gas geochemical compositions using data available for samples collected in British Columbia in its current and future hydrocarbon resource development areas.

Standardizing Risk Assessment Approaches Based on Residual Mass vs. Numerical Endpoints: Phase 2

Launched as two tasks, the project aims to provide a framework that will facilitate and support regulatory review and acceptance of submissions based on residual mass approaches.

- Task A. (Q2-Q3, 2019): Identify and engage key regulators to provide feedback on this initiative. Explore regulator needs and challenges in being able to accept remedial plans based on numerical modelling. Discuss ways in which the existing project helps meet these needs, and any additional measures that may be required. Identify tools and techniques that will enable the regulatory community to review and accept these kinds of approaches with confidence.
- Task B. (Q4, 2019): Update the Phase 1 project report based on the regulatory discussions in Task A. Submit the updated report to PTAC and the regulatory community for adoption either as an internal tool for regulator reference or as a published piece of regulatory guidance depending on the discussions in Task A.

This project is 75 percent completed with a final report available in Q2 2020.

Surface Water Diversion Learning Portal

This is a learning portal for personnel within Alberta's oil and gas industry, specifically to better understand the environmental risks associated with water use and to shed light on the industry's legal obligations under the Water Act.

Systematic Third-party Validation of Environmental and Economic Performance of Methane Reduction Technologies

Funded through Alberta Innovates and several producers, Systematic Third-party Validation (STV) will remove critical barriers to the vast deployment of methane reduction technologies. By providing neutral, third-party information to allow purchase of equipment, this three-year project will also boost economic growth to SMEs as well as directly reduce GHG emissions.

Targeting Alternate Prey to Understand Caribou and Moose Habitat Management Choices in a Regenerating Landscape: Increasing Functional Habitat for Caribou Within West-Central Ranges

This project focuses on cost-effective approaches to maximize the effectiveness of habitat restoration surrounding caribou recovery. By understanding attributes of landscape features that are preferred and avoided by moose within caribou ranges, we can successfully enhance caribou functional habitat by targeting restoration to habitats preferred by moose. By reducing the attractiveness of landscape features for moose, we can decrease moose numbers within caribou range, increasing the spatial separation between caribou and moose, and decreasing wolf predation on caribou.

Targeted PureJet Incinerators for Methane Challenges

When flaring is unviable or uneconomic, venting may occur. Targeted at eliminating this risk, PTAC partnered Cenovus Energy, Husky Energy, and Alberta-based Atlantis Research Labs to develop the PureJet Incinerator. This device, coupled with its ability to handle a wide range of pressures and flow rates, to enable methane to be destroyed at sites. Two field trials took place in 2019 and work is continuing in 2020.

THE PTAC COLLABORATIVE MODEL

A Right-Sized Solution for Right Now

Technology drives the modern oil and gas industry. Technological innovation touches every aspect of our business - how we extract resources; how we control costs; how we mitigate environmental impact; how we communicate. But research and technology development are expensive, and we are now facing one of the hardest seasons in the history of our industry. The PTAC Collaborative Model was created for times like this.

What is the PTAC Collaborative Model?

The PTAC collaborative model connects a variety of stakeholders to cost-effectively pursue research and development projects to solve common problems. PTAC provides neutral facilitation and project management.

Why Collaboration?

Bringing together the diverse skills and perspectives of producers, research providers, government, transporters, and service and supply companies leverages expertise, influence, and capacity.

Mobilizing funding from all stakeholders enables the pursuit of large research and development projects that would be too costly for an individual organization to tackle on their own

Collaboration promotes a wholistic approach to projects, sparking fresh ideas and facilitating candid conversations that lead to efficiencies and innovation.

Leveraging both funding and expertise mitigates a variety of individual risks and ensures collective commitment to success.

VALUE PROPOSITION

There is significant value that industry gains through involvement and funding. Properly designed regulations based on scientific and engineering facts improve all parties reputation.

Randy Dobko
Air Policy, Alberta Environment

The PTAC AUPF program provides the space and support for outcome-based collaboration with the goal to enhance environmental and operational performance.

Ole Mrklas
Director, Monitoring, COSIA

As a result of the highly regarded technical expertise and sound science... PTAC projects far exceeded our expectations when providing innovative solutions and smart regulatory development.

Sonia Glubish
Remediation Coordinator, Canadian Natural

OUR PROGRAMS



Cost Reduction



Research and Development



Technology Deployment



Informing Smart Policies



Collaboration

COMMITTEES

“Alone we can do so little; together we can do so much.”

– Helen Keller

In order to run an effective association, help is needed from its members. From standing and steering committees to consortiums and advisory councils, work is accomplished by involving people in areas that interest them.

AIR RESEARCH PLANNING COMMITTEE (ARPC)

ARPC supports industry's desire for shared research development to develop credible and relevant information to address knowledge gaps in the understanding and management of high priority environmental and social matters. The goal of ARPC is to initiate credible research projects, both fundamental and applied, on existing and emerging environmental issues to support both development of new regulatory requirements and industry best practices.

COMMITTEE MEMBERS

- Moruf Aminu, Encana
- Mark Anderson, Husky Energy
- Jacob Bayda, Saskatchewan Ministry of Energy and Resources
- James Beck, Suncor Energy
- Paolo Bomben, Alberta Innovates
- Laureen Chung, Environment and Climate Change Canada
- Randy Dobko, Alberta Environment and Parks
- Don D'Souza, BC Oil & Gas Commission
- Richelle Foster, Canadian Natural Resources Limited
- Roopa Ganapathy, Environment and Climate Change Canada
- Sean Hiebert, Cenovus Energy
- Wayne Hillier, Canadian Association of Petroleum Producers
- Marie Johnson, BC Oil & Gas Commission
- Neuczki Mathurin, TC Energy
- Sean Mercer, Imperial Oil
- Rekha Nambiar, Suncor Energy
- Filiz Onder, Encana
- Koray Onder, TC Energy
- Gerald Palanca, Alberta Energy Regulator
- Cassandra Schostek, Alberta Energy Regulator
- Brian Spiegelmann, NAL Resources Management Ltd.
- Greg Unrau, Repsol
- Carolyn Ussher, CNOOC Petroleum North America ULC

CANADIAN EMISSIONS REDUCTION INNOVATION CONSORTIUM

The Canadian Emissions Reduction Innovation Consortium is a network of emissions reduction test facilities with a vision to encourage national integration and collaboration, avoid duplication, host open information sharing and maintain Canadian global innovation leadership. CanERIC will be anchored by its founding members but will accept new members to provide facilities responding to innovation needs of TRL 5-9 technologies.

INFRASTRUCTURE COMMITTEE MEMBERS

- Clay Bell, Colorado State University
- Richelle Foster, Canadian Natural Resources Limited
- Chris Hugenholtz, University of Calgary
- Matthew Johnson, Carleton University
- Larry Kostiuk, University of Alberta
- Mohammad Latifi, Polytechnique Montreal
- Nader Mahinpey, University of Calgary
- Karim Nafis, CanmetENERGY
- Jason Olfert, University of Alberta
- Kirk Osadetz, CMC Research Institutes
- Erin Powell, Saskatchewan Research Council
- Arvind P. Ravikumar, Harrisburg University
- David Risk, St. Francis Xavier University
- David Simakov, University of Waterloo
- Rick Tofani, Southern Alberta Institute of Technology
- Fred Wassmuth, InnoTech Calgary
- Neil Yaremchuk, InnoTech Vegreville

INDUSTRY SOLUTIONS COMMITTEE MEMBERS

- Moruf Aminu, Encana
- Brodie Chalmers, ATCO
- Richelle Foster, Canadian Natural Resources Limited
- Gian Fradelizio, Chevron Canada
- Owen Henshaw, Husky Energy
- Sean Hiebert, Cenovus Energy
- Patrick Kelly, TC Energy
- Sean Mercer, Imperial Oil
- Susan Milburn, Suncor Energy
- Chris Morrison, PETRONAS
- Dan Morrison, Inter Pipeline
- Stephanie Neilson, Murphy Oil Corporation
- Mike Nerbas, Whitecap Resources
- Kelly Prevost, PETRONAS
- Vincent Saubestre, Total E&P Canada Ltd.
- Brian Spiegelmann, NAL Resources Management Ltd.
- Ken Woloschuk, Seven Generations Energy

CONSORTIUM OF DIGITAL INNOVATION AND TRANSFORMATION

Digital is a key enabler to reduce costs, increase efficiency and productivity, and make better business decisions. Nine major energy companies form CDIT. Together, along with other industry leaders, CDIT identifies and solves a number of common digital innovation challenges. Members noted with an asterisk* are also part of a CDIT sub-committee focused on drones.

COMMITTEE MEMBERS

- Mateo Arias, TC Energy*
- Dion Balson, Canadian Natural Resources Limited
- Damien Barrington, Husky Energy*
- Greg Bolzon, Canadian Natural Resources Limited
- Ed Cullinan, ATCO
- Jeffrey Dueck, Chevron
- Colin Forsyth, Syncrude*
- Chris Godwaldt, Canadian Oil Sands Innovation Alliance*
- Jason Hinchcliff, Husky Energy*
- Alistair Kirk, Imperial Oil*
- Morley Kjargaard, Alberta Economic Development, Trade and Tourism*
- Jeff LaFrenz, Vizworx*
- Michael Loughlean, Suncor Energy*
- Angela MacPherson, TC Energy
- David Marshall, Chevron
- Glen McCrimmon, Husky Energy*
- Jack O'Neill, Canadian Oil Sands Innovation Alliance*
- John Paul Portelli, Canadian Natural Resources Limited*
- Khaled Rafih, Husky Energy*
- Tamara Rego, TC Energy
- Tania Rizwan, TC Energy*
- Victoria Ross, Ovintiv
- Mark Sombach, Syncrude*
- Michael Teshima, Suncor Energy
- Howie Truong, Canadian Natural Resources Limited*
- Stan Tumoth, TC Energy*
- Armin Vatandoust, Suncor Energy*
- Steve Walker, Suncor Energy*
- Heather Wilcott, Imperial Oil*

ECOLOGICAL RESEARCH PLANNING COMMITTEE

ERPC will support industry's desire for shared research to develop credible and relevant information to address knowledge gaps in the understanding and management of high priority environmental and social matters related to resource access issues such as caribou, habitat relationship for listed species, wetlands, reclamation, and mitigations.

COMMITTEE MEMBERS

- Carol Barsky, Canadian Association of Petroleum Producers
- Mark Boulton, Suncor Energy
- Richard Chabaylo, Alberta Energy Regulator
- Scott Grindal, ConocoPhillips Canada
- Ben Hale, Husky Energy
- Lori Neufeld, Imperial Oil Limited
- Shane Patterson, Alberta Environment and Parks
- Samuel Rawluk, Canadian Association of Petroleum Producers
- Jennifer Shalagan, Husky Energy
- Jordan Smith, Canadian Natural Resources Limited

ELECTRIC DUMP VALVE ACTUATOR STEERING COMMITTEE

Used to provide process control over flow rate, pressure, and temperature, pneumatic devices account for approximately 20 percent of methane emissions in the Canadian oil and gas sector. This steering committee oversees design, fabrication, shop tests, and field tests of a zero-emission, affordable, and fail-safe electric dump valve actuator to replace existing pneumatic valves.

COMMITTEE MEMBERS

- Ronda Foster, Linear Motion Technologies
- Owen Henshaw, Husky Energy
- Sean Hiebert, Cenovus Energy
- Ray Lambert, Cenovus Energy
- Brad Morello, Shell Canada Limited
- Brian Spiegelmann, NAL Resources Management Ltd.
- Brian Van Vliet, Spartan Controls
- Charles Whitehead, Linear Motion Technologies
- Jim Wilson, Linear Motion Technologies

MULTILATERAL JUNCTION TESTING AND FIELD TRIAL, FOR PERMANENT AND SCALABLE METHANE EMISSIONS REDUCTIONS PROJECT STEERING COMMITTEE

Launched in 2018, this steering committee oversees the manufacturing, bench-testing, and demonstration of a novel patented multilateral junction. This PTAC project not only leads to permanent and scalable GHG emissions reduction, but also significantly reduces capital and operating expenses associated with the development of shale formations such as the Montney play.

COMMITTEE MEMBERS

- Emile Abou-Khalil, Seven Generations Energy
- Bruce Duong, Alberta Innovates
- Kyle Klam, Modern Wellbore Solutions
- Matthew Larsen, Seven Generations Energy
- Kyle Maguire, Modern Wellbore Solutions
- Clinton Meads, Seven Generations Energy
- Cara Tardiff, Modern Wellbore Solutions

METHANE CONSORTIA PROGRAM STEERING COMMITTEE

In our constant endeavor to lower methane emissions through innovation, PTAC – along with Energy Efficiency Alberta – formed the Methane Consortia Program. This collaborative committee promotes innovation within the Alberta oil and gas sector.

COMMITTEE MEMBERS

- Jennifer D'Aoust, Energy Efficiency Alberta
- Darryl Hill, Energy Efficiency Alberta
- Wayne Hillier, Canadian Association of Petroleum Producers
- Chris Hugenholtz, University of Calgary
- Gerald Palanca, Alberta Energy Regulator
- Jesse Row, Energy Efficiency Alberta
- Jessica Schumlich, Energy Efficiency Alberta

PIPELINE ABANDONMENT RESEARCH STEERING COMMITTEE

The Canadian oil and gas industry recognizes the need to abandon oil and gas pipelines in an environmentally sound, safe, and economical manner. Research to develop federal and provincial guidelines is crucial in fulfilling these needs. PARSC is composed of industry stakeholders with relevant expertise pertaining to pipeline technical and environmental considerations.

COMMITTEE MEMBERS

- Frank Annau, Canadian Federation of Agriculture
- Isabelle Bouffard, Union des Producteurs Agricoles du Quebec
- Tijani Elabor, Canadian Energy Regulator
- Waqis Hanif, TC Energy
- Rajan Lalli, Trans Mountain Pipeline
- Kristen MacQueen, TC Energy
- Usha Mulukutla, Canadian Energy Regulator
- Kori Patrick, Enbridge Inc.
- Rob Power, Enbridge Inc.
- Patrick Smyth, Canadian Energy Pipeline Association

PUREJET STEERING COMMITTEE

When flaring is unviable or uneconomic, venting may occur. Targeted at eliminating this risk, PTAC partnered Cenovus Energy, Husky Energy, and Alberta-based Atlantis Research Labs to develop the PureJet Incinerator. This device, coupled with its ability to handle a wide range of pressures and flow rates, to enable methane to be destroyed at sites.

COMMITTEE MEMBERS

- Aaron Baugh, Emissions Reduction Alberta
- Owen Henshaw, Husky Energy
- Paul Morgan, Atlantis Research Labs
- Janelle Mravcak, Atlantis Research Labs
- Vladimir Mravcak, Atlantis Research Labs

RECLAMATION AND REMEDIATION RESEARCH COMMITTEE

RRRC will support industry's desire for shared research development to develop credible and relevant information to address knowledge gaps in the understanding and management of high priority environmental and social matters related to the assessment and management of exploration and production sites as related to geo-environmental protection, soil and groundwater remediation and reclamation, excluding water use, conservation and resource issues.

COMMITTEE MEMBERS

- Jason Desilets, Cenovus Energy
- Gordon Dinwoodie, Alberta Environment and Parks
- Linda Eastcott, Imperial Oil
- Shawn Glessing, Husky Energy
- Sonia Glubish, Canadian Natural Resources Limited
- Paul Hartzheim, Canadian Association of Petroleum Producers
- Adam Judd, Keyera
- Tom Knapik, Plains Midstream Canada ULC
- Steve Kullman, Husky Energy
- Daniel Pollard, Alberta Energy Regulator
- Wanda Sakura, Orphan Well Association
- Debbie Tainton, Canadian Natural Resources Limited
- Mike Truzak, Enerplus
- Lisa Warren, Husky Energy

SMALL AND MEDIUM-SIZED ENTERPRISES PROGRAM

Some of the industry's most ground-breaking innovations flow from the Small and Medium-Sized Enterprise (SME) sector, yet these small companies often face significant barriers in bringing their ideas to market. PTAC facilitates the SME program in collaboration with the National Research Council Industrial Research Assistance Program (NRC-IRAP), providing oil and gas SMEs with innovation support, particularly for the demonstration and deployment of near-commercial or deployment-ready technologies that improve environmental performance and reduce costs.

COMMITTEE MEMBERS

- Tamer Al-Ramahi, NRC-IRAP
- Gordon Jolly, NRC-IRAP
- Arvinder Kainth, NRC-IRAP
- Steven Keays, NRC-IRAP
- Ron Quick, NRC-IRAP

TECHNOLOGY FOR EMISSIONS REDUCTION AND ECO-EFFICIENCY

TEREE is a consortium of industry and provincial and federal government representatives convened to oversee finding and implementing new technology and methods required to achieve air emissions reductions in the upstream Oil and Gas industry. TERE projects have made a significant contribution to industry through the transfer of technologies used globally in the sector.

COMMITTEE MEMBERS

- Moruf Aminu, Encana
- Dean Anderson, Baseline Regulatory Compliance Services
- Joshua Anhalt, GreenPath Energy
- Brenna Barlow, DXD Consulting
- James Beck, Suncor Energy
- Jamie Callendar, Callendar Energy Services
- Keven Cann, Husky Energy
- Mike D'Antoni, GreenPath Energy
- Jennifer Daoust, Energy Efficiency Alberta
- Yonathan Dattner, Luxmux Corporation
- Cam Dowler, Spartan Controls
- Don D'Souza, Government of British Columbia
- Bruce Duong, Alberta Innovates
- Daniel Feldman, Luxmux Corporation
- Richelle Foster, Canadian Natural Resources Limited
- Wes Funk, DXD Consulting
- Kevin Heal, Cap-Op Energy
- Owen Henshaw, Husky Energy

- Sean Hiebert, Cenovus Energy
- Wayne Hillier, Canadian Association of Petroleum Producers
- James Holoboff, Process Ecology
- Roy Hunt, Advisian
- Mark Jamieson, Alberta Energy
- Yori Jamin, Clearstone Engineering
- Paul Jiapizian, Environment Canada
- Laura Johnson, Alberta Energy Regulator
- Arvinder Kainth, National Research Council Industrial Research Assistance Program
- Derek Kelly, Natural Resources Canada
- Milos Krnjaja, Alberta Energy Regulator
- Ray Lambert, Cenovus Energy
- Michael Lawson, Alberta Energy Regulator
- Logan Leduc, Environment Canada
- Derek L'Hirondelle, Simark Controls

- Kelsey Locke, Blue Source Canada
- Andrew McClausland, Cap-Op Energy
- Don McCrimmon, Canadian Association of Petroleum Producers
- Sean Mercer, Imperial Oil
- Rekha Nambiar, Suncor Energy
- Kelly Newnham, Advisian
- Chelsea O'Connor, Simark Controls
- Kirk Osadetz, CMC Research Institutes
- Gerald Palanca, Alberta Energy Regulator
- Kelly Parker, Canadian Oil Sands Innovation Alliance
- Rick Phaneuf, Alberta Environment
- Roy Quick, National Research Council Industrial Research Assistance Program
- Rao Ravi, Spartan Controls
- Cooper Robinson, Cap-Op Energy
- Cassandra Schostek, Alberta Energy Regulator

- Jessica Schumlich, Energy Efficiency Alberta
- Shivangi Sharma, New Paradigm Engineering
- Monica Sippola, Multisensor Scientific
- Jonathan Smith, Blue Source Canada
- Scott Smith, Cenovus Energy
- Brian Spiegelmann, NAL Resources Management Ltd.
- Ryan Streams, Kairos Aerospace
- Lisa Studzinski, Enerplus
- Mark Summers, Emissions Reduction Alberta
- Tyler Tarnoczki, Cenovus Energy
- Catherine Thistlethwaite, Alberta Energy Regulator
- Greg Unrau, Repsol
- Brian Van Vliet, Spartan Controls
- Charles Ward, Alberta Department of Energy
- Kourosh Zanganeh, Natural Resources Canada
- Adele Zenide, Canadian Natural Resources Limited

WATER INNOVATION PLANNING COMMITTEE

WIPC directs resources to projects addressing water issues related to upstream oil and natural gas development, excluding oil sands. Not only does the committee define and articulate key challenges for the energy sector including water sourcing, storage, transport, treatment, recycling/reuse and disposal, it also identifies opportunities of shared research needs between stakeholders. Priority water issues include safeguarding groundwater and surface water quantity and quality, enabling the use of alternative water sources to high quality non-saline water, credible water data and improving operational business environment through efficiencies and cost saving water management.

COMMITTEE MEMBERS

- Jarred Anstett, Murphy Oil
- James Armstrong, Encana Corporation
- Michael Bevan, Alberta Energy Regulator
- Courtney Blackmore, MEG Energy
- Deanna Cottrell, Shell Canada Limited
- Luke Donnelly, Repsol
- Neil Fricke, Suncor Energy

- Anil Gupta, Alberta Environment and Parks
- Scott Hillier, Cenovus Energy
- Sharla Howard, Husky Energy
- Paul Martin, ConoccoPhillips Canada
- Matt Mclean, Husky Energy
- Janet McNally, NuVista Energy Ltd.
- Brent Moore, Canadian Natural Resources Limited

- Michelle Morris, Alberta Environment and Parks
- Tara Payment, Canadian Association of Petroleum Producers
- Scott Rayner, Meg Energy
- JoAnne Volk, Repsol
- Steve Wallace, Alberta Environment and Parks
- Niki Weinrauch, Cenovus Energy
- Jeff Willick, Canadian Natural Resources Limited

WELL ABANDONMENT RESEARCH INITIATIVE

WARI will support industry's desire for shared research to develop credible and relevant information to address knowledge gaps related to suspended, abandoned, remediated, and reclaimed wells. A collaborative approach engages subject matter experts, from industry, government, and academia, to identify and prioritize knowledge gaps resulting in research projects addressing high priority environmental and social matters.

COMMITTEE MEMBERS

- Paul Aguas, Alberta Energy Regulator
- Ken Choi, Orphan Well Association
- Deanna Cottrell, Shell Canada Limited
- Leah Davies, Imperial Oil
- Shawn Forster, Husky Energy
- Ben Fraser, Imperial Oil
- Wade Hartzell, Canadian Natural Resources Limited
- Paul Hartzheim, Canadian Association of Petroleum Producers
- Salim Jagirdhar, Canadian Association of Petroleum Producers

- Kasem Kaci, Alberta Energy Regulator
- Ken Masich, Alberta Energy Regulator
- Ryan Munro, Canadian Natural Resources Limited
- Shanna Nolan, Shell Canada Limited
- Benjamin Ringrose, Orphan Well Association
- Dave Samuelson, Cenovus Energy
- Rajan Varughese, Alberta Energy Regulator
- Niki Weinrauch, Cenovus Energy

ANNUAL EVENTS



Annual General Meeting and Awards Luncheon

The PTAC Annual General Meeting and Awards Luncheon was held May 1, 2019 at the Calgary Petroleum Club. The event highlighted PTAC's achievements for 2018 and recognized businesses and individuals for their significant contributions and leadership. Steve MacDonald, CEO of Emissions Reduction Alberta, gave a keynote address about the importance of Collaborative Innovation in Oil and Gas.



Remediation and Reclamation Forum

The Remediation and Reclamation Forum provides an excellent opportunity for stakeholders to engage with the Remediation and Reclamation Research Committee (RRRC). On May 2, 2019 presentations from current research projects demonstrated improved environmental performance, delivered significant cost reductions, as well as supported timeline reductions to moving sites to closures.



Digital Innovation in Oil and Gas Forum

The Canadian oil and gas industry is entering an era of considerable transformation. PTAC's annual Digital Innovation in Oil and Gas forum provides attendees with insight into current and developing technologies and how they are influencing industry operations, as well as the impact digital innovations will have on the future. On September 26, 2019, leading experts across the digital spectrum spoke on the current state of technology within our industry, implementation challenges, and the outlook for a future where oil and gas and digital technologies are inextricably intertwined.



Innovation Showcase

Our industry faces the unique challenge of reducing operational costs while implementing more efficient processes to improve overall company performance and safety. This is why each year PTAC brings together SME technology service providers and industry end-users at our Innovation Showcase. On October 24, 2019, attendees perused the tradeshow floor full of innovative technologies. Specific vendors were invited to pitch to a group of industry experts, decision makers, and media.



Methane Emissions Reduction Forum

Largely regarded as PTAC's most informative event, the annual Methane Emissions Reduction Forum focuses on various aspects of reducing methane emissions from oil and gas operations including regulation development, resources and opportunities available to industry, as well as, detection, quantification, and mitigation technologies. A sold out event, the second-annual forum held on November 26 and 27 at the Rimrock Resort Hotel in Banff, Alberta discussed challenges facing the Canadian oil and gas industry related to 2025 methane emissions reductions targets and looked closer at opportunities available to support technology innovation and new practices. This year also included a student-led competition, a highly engaging networking reception, and the introduction of an exhibition hall.



Ecological Issues Forum

The oil and gas industry is committed to reducing impacts to biodiversity and ecological processes. From wildlife responses to sector activity to the effectiveness of footprint reclamation and functional restoration, the Ecological Issues Forum provides technical updates on the millions of dollars oil and gas producers invest in with regards to ecological related research projects. This year's event, held on December 5, 2019, covered a variety of topics including specific species behaviours, vegetation and habitat management choices, and future impact to policy and regulations. It also introduced new initiatives identified as priority issues.

ADDITIONAL EVENTS

In addition to large annual events, PTAC encourages stakeholders to engage in a wide array of monthly functions and smaller initiatives as an enriching element of the PTAC membership. These events provide participants opportunities to further develop the broad themes central to PTAC's mission. Further, they are a platform for leading think tanks, government bodies, and organizations to present their research and findings.

Technology Information Session

Technology Information Sessions (TIS) allow companies to present in front of a group of industry experts in the hopes of gaining brand, product, and service awareness.

Lunch and Learn

Lunch and Learn events revolve around education. New learnings, best practices, etc. are presented to attendees both in-person and online.

Innovation Café

Innovation Cafes invite friendly discussion where everyone has the right to contribute. These informal events aim to solve a problem with inspiring brainstorming sessions around knowledge gaps.

The following events of these variety took place this year:

- Methane Measurement and Emissions Quantification with Next-Generation Sensor Technology
- Profitable Solutions for Energy Companies: Processing Natural Gas into Bitcoin presented by LuTech
- Entrepreneurial Management Workshop
- Cost-effective and Environmentally Beneficial Oil and Gas Practice
- The PAGE Process: Palmers Acid Gas Enrichment Process Explained
- Eliminate Emissions and Create Carbon Credits
- Dual Frequency Comb Methane Leak Detection presented by the University of Colorado
- Clean power from natural gas, without combustion presented by Anax Power
- Utilizing RFID, GPS and Tablets for Effective Digital Data Collection and Management presented by Advanced Data Logistics
- HERO: Hydrogen Economy Retrofit Option presented by Patro Research Ltd. and New Paradigm Engineering
- Efficient design for extra Watts and BTU's presented by OilPro
- Disruptive Compression Technology for Production Process Enhancement Solutions presented by Caltech Production Solutions

Networking Opportunities

Collaboration does not happen in a vacuum. Networking outside of traditional events allows individuals to connect with peers, mentors, and other industry leaders. PTAC hosts unparalleled networking opportunities to members and non-members in an array of topics. These events are a hotbed of ideas and collaborative efforts.

The following networking opportunities took place in 2019:

- Eco-Efficiency and Emissions Reduction Mixer
- Digital Innovation Network Launch Party
- Stampede Chili Cook-off
- Diversity in Oil & Gas: Panel Discussion and Networking

Reaching New Audiences

PTAC has been honored to present at conferences and events on a range of industry topics. From project learnings to research programs, these opportunities allow us to disseminate our proven business model and value propositions to a wider audience.

In 2019, PTAC was invited to participate in the following events:

- IOT in Oil and Gas Canada
- Blockchain in Oil and Gas Canada
- Alberta Energy Regulator Information Sessions: Grand Prairie
- Alberta Energy Regulator Information Sessions: Calgary
- Air & Waste Management Association Annual Conference and Exhibition
- Energy Connect Virtual Oil and Gas Conference

AWARD RECIPIENTS

Annual General Meeting Awards

Every year, PTAC recognizes those who have made a significant impact within PTAC and its many member committees. Fifteen deserving businesses and individuals who promote positive leadership and outstanding service to both PTAC and the oil and gas community were presented with awards at the 22nd annual event.

Corporate Leadership

Canadian Natural Resources Limited



Commercialization of SME Technology

LCO Technologies



Outstanding Contributions in Research

Millenium EMS Solutions



Chairperson's Award

Joy Romero
Canadian Natural Resources Limited



President's Award

John Zhou
Alberta Innovates



Distinguished Service

Gordon Dinwoodie
Alberta Environment and Parks



Eco-Efficiency Leadership

Brian Van Vliet
Spartan Controls



Outstanding Service

Randy Cormier



Laurier Schramm
Saskatchewan Research Council



Collaborative Innovation Leadership

Cory Bergh
NAL Resources



Reclamation and Remediation Research Leadership

Daniel Pollard
Alberta Environment and Parks



Ecological Leadership

Jennifer Shalagan
Husky Energy



Pipeline Leadership

Waqas Hanif
TC Energy



Water Innovation Leadership

Joanne Volk
Repsol



Air Quality R&D Leadership

Richelle Foster
Canadian Natural Resources Limited



Water Innovation Leadership

Wade Hartzell
Canadian Natural Resources Limited



Innovation Awards

Digital Innovation - VizworX

VizworX is a full-service custom solutions developer, providing organizations better engagement with data using interactive visualization and leading-edge technology solutions in AI and web and mobile applications.

Methane Innovation - GreenPath Energy

GreenPath Energy is an emission management service and solution provider for the oil and gas industry, specializing in infrared emissions detection, fugitive emission measurement, and reduction and elimination solutions.

SME Pitch Awards

Technology Innovation

First Place: VizworX

VizworX is a full-service custom solutions developer, providing organizations better engagement with data using interactive visualization such as AR/VR/MR, and leading-edge technology solutions in AI and web and mobile applications.

Second Place: Ingu Solutions

Ingu Solutions is a technology provider utilizing miniaturized mobile sensors dubbed Pipers[®] that can detect leaks, geometric defects and deposits.

GHG Emissions Reduction

First Place: Westgen Technologies

Westgen Technologies is a remote power generation company aiming to reduce development costs while improving environmental sustainability in the Canadian upstream oil and gas industry.

Second Place: TriCore Carbon Solutions

TriCore Carbon Solutions is a joint venture between three Albertan class-leading reputable partners: Trido Industries, Carbon Credit Solutions, and General Magnetic.

MERF 2019 Student Poster Awards

First Place

Collaborative LDAR Improves Efficiency & Reduces Cost

University of Calgary:
Mozhou Gao, Chris Hugenholtz,
Marshall Staples, Thomas Fox,
Thomas Barchyn, Tyler Gough

Second Place

The Effects of Turbulent Cross-Winds on Combusting Jets at Low Velocity Ratios

Western University:
M. M. Hossain, D. Cui, D. Corbin, G.
A. Kopp

Third Place

Experimental Study of Co-flow Steam-assisted Flare: Emissions and Hydrodynamics

University of Alberta:
Milad Zamani, Ehsan Abbasi-Atibeh,
Jason S. Olfert, Larry W. Kostiuk

DIGITAL MARKETING ACTIVITY



 **83%**

FOLLOWER
INCREASE

AUDIENCE

1127
Followers

ENGAGEMENT

56,908
Impressions

PTAC LinkedIn
page received
1590 unique views
over 123 posts



 **37%**

FOLLOWER
INCREASE

AUDIENCE

1002
Followers

ENGAGEMENT

176.6k
Impressions

PTAC Twitter
posts averaged
78.8k impressions
over 224 posts



 **26%**

SUBSCRIBER
INCREASE

AUDIENCE

5880
Subscribers

ENGAGEMENT

38%
Opening Rate

PTAC newsletters
achieved a **7 percent**
Click Through Rate
over 27 emails

2019 MEMBERS

PTAC's membership totalled 225 active members at year-end.

Academia

- Carleton University
- Polytechnique Montréal
- Southern Alberta Institute of Technology
- University of Alberta
- University of Calgary

Associations

- Alacrity Foundation
- Alberta Canada Fusion Technology Alliance
- BC Innovation Council
- Canadian Association of Petroleum Producers
- Canadian Energy Pipeline Association
- Canadian Geothermal Energy Association
- Clean Resources Innovation Network
- CSA Group
- Environmental Services Association of Alberta
- Innovate Calgary
- Petroleum Services Association of Calgary
- TECTERRA

Government

- Alberta Department of Energy
- Alberta Economic Development and Trade
- Alberta Energy Regulator
- Alberta Environment and Parks
- Environment Canada
- National Research Council - Industrial Research Assistance Program
- British Columbia Oil and Gas Commission
- CRA Canada Revenue Agency - Calgary CTSO SR & ED
- Energy Efficiency Alberta

Individuals

- Dr. Hafez Balavi
- Mark Beasse
- Geoffrey Cann
- Todd den Engelsen
- Carol Engstrom
- Peter Ficocelli
- Larry Frederick
- John Hetherington
- Peter Holmes
- Jim Kelsall
- Eric Lloyd
- Ken Putt
- George Rhodey
- Dave Rushford
- Earle Shirley
- Monica Sippola
- Murray Todd
- Henry van der Sloot

Producers

- Bonavista Energy Corporation
- Canadian Natural Resources Limited
- Cenovus Energy Inc.
- Chevron Canada Resources
- ConocoPhillips Canada
- Devon Canada Corporation
- Enerplus Corporation
- Husky Energy Inc.
- Imperial Oil Limited
- Japan Canada Oil Sands Limited
- Jupiter Resources
- NAL Resources
- Nexen Energy ULC
- NuVista Energy
- Ovintiv Canada ULC
- PetroChina Canada
- Repsol Oil and Gas Canada Inc.
- Suncor Energy
- Torxen Energy

Research Providers

- Alberta Innovates
- Alberta Sulphur Research Ltd.
- Bureau Veritas
- Canadian Photonic Industry Consortium
- CMC Institutes
- fRI Research
- Gas Technology Institute
- Genome Alberta
- Innocorps Research
- InnoTech Alberta
- Natural Resources Canada
- Patro Research Ltd.
- Petroleum Technology Research Centre
- Saskatchewan Research Council
- Strategic Timelines
- Terrestrial Energy Inc.
- zEroCor Tubulars Inc.
- Waterline Resources Inc. - Environmental Team

Service and Supply

- ABC Engineering
- Aceleware Ltd.
- Advanced Data Logistics
- Advisian
- Agat Labs
- Agripower Inc.
- Algo8
- Altus Group
- AMGAS Services Inc.
- Ammolite Analytix
- Anax Power
- ARCADIS Canada
- Arolytics
- ASSIST Energy Services
- Atlantis Research Labs
- AUTOSOL
- Black Gold Rush Industries
- Blue Source Canada ULC
- Blue Spark Energy



Service and Supply Continued

- Boreal Laser
- Bridger Photonics
- CalgaRIG
- Calscan Energy Ltd.
- Cap-Op Energy
- Caron Measurement & Controls
- CEL Quality Services
- CH2M Hill
- Clarifi Inc.
- CLEAResult
- Clearstone Engineering Ltd.
- CNTRAL Inc.
- Computer Modelling Group Ltd.
- COOEC Canada Company Ltd.
- Crimson Regulatory
- Crossroad Energy Solutions Inc.
- DXD Consulting
- Emission Rx
- ENA2 Innovative Consulting Inc.
- enSift Corp.
- Ensol Systems
- Envirosoft Products Inc.
- Envirotech Engineering
- Equilibrium Environmental
- Expansion Power
- Expeto Wireless Ltd.
- Extreme Telematics Corp.
- FieldCap
- FLIR System Inc.
- Gas Activated Systems
- Gas Pro Compression
- Gasteq Inc.
- GCHEM Ltd.
- Gentherm Global Power Technologies
- geoLOGIC Systems Ltd.
- GHGSat Inc.
- Global Talent Accelerator
- Golder Associates
- Goliath Snubbing Ltd.
- GreenPath Energy Ltd.
- H2Sweet Inc.
- Halliburton Group Canada
- Hatch Ltd.
- Hatfield Consultants
- Heath Consultants
- Higher Ground Consulting
- II-VI Marlow
- Ingu Solutions Inc.
- INO
- Integrated Sustainability Consultants Ltd.
- Jambo
- Kairos Aerospace
- Katch Kan Limited
- Kenilworth Combustion Ltd.
- Kinetica Ventures
- KPMG High Technology Practice Group
- LCO Technologies
- LiDAR Services International
- Linear Motion Technologies Canada
- LOOKNorth
- LuTech
- Lux Modus Ltd.
- Luxmux Technology Corporation
- Matrix Solutions
- Millenium EMS Solutions Ltd.
- Modern Wellbore
- Muddy Boots Online
- Multisensor Scientific
- New Oil Generation
- New Paradigm Engineering Ltd.
- Nexus Space Canada
- North Shore Environmental Consultants
- OilPro Oilfield Production Equipment Ltd.
- Osperity
- Portfire Associates
- Proactive Environmental Rentals Inc.
- Process Ecology Inc.
- Professionals for Humanity
- Quebe Technologies Inc.
- ROSEN Canada
- Roska DBO Inc.
- RWDI
- SAFCell Inc.
- Schlumberger Canada Ltd.
- SeekOps
- Sibex International Inc.
- Simark Controls
- Sirius Instrumentation & Controls Inc.
- SLR Consulting
- SM Instruments
- SNC-Lavalin Inc, Environment & Geoscience
- Solstice Canada Corp.
- Spartan Controls - Efficiency Group
- Strategic Capability Network
- Surface Solutions
- Syncrude
- Target Emission Services
- Teck Resources
- Tecvalco
- TerraHub Technologies Inc.
- Terrapro Group
- Tetra Tech
- Thin Air Labs
- Titan Logix Corporation
- Titanium Tubing
- Tomahawk Energy Services Limited Partnership
- Total Combustion Inc.
- Trace Associates
- TriAcc
- TriCore Carbon Solutions Inc.
- TSGI Corporation
- Tundra Process Solutions
- VEERUM
- Vertex
- VizworX Inc.
- WaVv Strategic Consulting
- Westgen Technologies Inc.
- Winterhawk Technologies Ltd.
- WSP

Transportation/Midstream

- Keyera Energy Ltd.
- TC Pipelines Ltd.

Venture Capital

- Evok Innovations
- First Merchants Capital Partners Inc.



AUDITOR'S REPORT

To the Members of Petroleum Technology Alliance Canada

Opinion

We have audited the financial statements of Petroleum Technology Alliance Canada (the "Organization"), which comprise the statement of financial position as at December 31, 2019, and the statements of operations, changes in net assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at December 31, 2019, and its results of operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Organization in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

BDO Canada, LLP
Chartered Professional Accountants

Calgary, Alberta
March 24, 2020

Statements of Financial Position as at December 31, 2019

	2019	2018
ASSETS		
Current		
Cash and cash equivalents (note 3)	\$ 2,478,185	\$ 1,504,106
Cash and cash equivalents- restricted (note 4)	4,143,783	3,228,251
Restricted short term investment (note 4)	1,403,571	2,205,640
Short term investments (note 6)	2,337,012	2,688,436
Goods and services tax receivable	41,671	7,422
Accounts receivable and accrued receivables (note 13)	936,254	569,466
Accounts receivable from related corporation (note 7)	58,994	-
Prepaid expenses	22,635	21,294
	<u>11,422,106</u>	<u>10,224,615</u>
Property and equipment (note 5)	2,806	6,066
	<u>\$ 11,424,912</u>	<u>\$ 10,230,681</u>
LIABILITIES		
Current		
Accounts payable and accrued liabilities	\$ 1,874,696	\$ 1,683,986
Deferred membership revenue (note 13)	50,452	-
	<u>1,925,148</u>	<u>1,683,986</u>
Deferred contributions (note 8 and 13)	4,895,077	4,454,572
Due to related corporation (note 7)	-	4,141
	<u>4,895,077</u>	<u>4,458,713</u>
NET ASSETS		
Invested in property and equipment	4,025	7,283
Internally restricted	3,200,663	2,680,699
Reserve	1,400,000	1,400,000
	<u>4,604,687</u>	<u>4,087,982</u>
	<u>\$ 11,424,912</u>	<u>\$ 10,230,681</u>

Statements of Operations as at December 31, 2019

	2019	2018
Revenue		
Project and service revenue (note 14 and 15)	\$ 6,641,155	\$ 5,884,466
Membership revenue	388,756	415,838
Event revenue (note 14)	234,572	186,512
Interest income	132,877	111,269
Realized / unrealized exchange gain	-	8,474
Miscellaneous income	-	1,835
	<u>7,397,360</u>	<u>6,590,494</u>
Expenses		
Direct project and service costs (note 14)	5,403,533	5,023,566
Salaries and benefits	1,111,894	1,018,255
Rent	115,470	75,638
Direct event costs	91,647	50,180
Consulting and professional fees	24,215	22,065
Bad debt	32,281	21,383
Office and equipment leases	16,135	14,984
Insurance	13,728	14,297
Marketing	12,328	13,725
Bank charges and credit card discounts	13,864	11,946
Volunteer recognition	13,552	11,037
Computer and website	14,192	8,839
Printing and publications	8,408	8,178
Training	6,150	6,482
Amortization	3,260	4,262
Realized / unrealized exchange loss	1	-
	<u>6,880,657</u>	<u>6,304,855</u>
Excess of revenue over expenses	<u>\$ 516,703</u>	<u>\$ 285,638</u>
	\$ 4,025	1,400,000
	\$ 3,196,532	4,131
	\$ 4,604,687	4,087,982

GLOSSARY OF TERMS

AIt FEMP	Alternative Fugitive Emission Monitoring Program
AMFC	Alberta Methane Field Challenge
ARPC	Air Research Planning Committee
AUPRF	Alberta Upstream Petroleum Research Fund
BVLOS	Beyond Visual Line of Sight
CanERIC	Canadian Emissions Reduction Innovation Consortium
CDIT	Consortium of Digital Innovation and Transformation
CRIN	Clean Resources Innovation Network
DIN	Digital Innovation Network
EDVA	Electronic Dump Valve Actuator
ERPC	Ecological Research Planning Committee
ESA	Environmental Site Assessments
FEMP	Fugitive Emission Monitoring Program
GHG	Greenhouse Gas
GM	Gas Migration
IM3S	Intelligent Methane Monitoring and Mitigation System
LDAR	Leak Detection and Repair
LDAR-SIM	Leak Detection and Repair Simulator
MCP	Methane Consortium Program
MERN	Methane Emissions Reduction Network
PARSC	Pipeline Abandonment Research Steering Committee
QOGI	Quantitative Optical Gas Imaging
RRRC	Reclamation and Remediation Research Committee
SCVF	Surface Casing Vent Flow
SSMEP	Support for Small and Medium-sized Enterprises Program
STV	Systematic Third Party Validation
TEREE	Technology for Emissions Reduction and Eco-Efficiency Program
TIS	Technology Information Session
UTM	Unmanned Traffic Management
WARI	Well Abandonment Research Initiative
WIPC	Water Innovation Planning Committee



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